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| 09/736,157      | 12/15/2000  | Raulf M. Polichar    | SAIC0010-US         | 8389             |

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EXAMINER

CHEN, KIN CHAN

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1765

DATE MAILED: 06/12/2003

17

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/736,157

Applicant(s)

POLICHAR ET AL.

Examiner

Kin-Chan Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 7-24 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-6 is/are allowed.
- 6) ☒ Claim(s) 25-28 and 30-44 is/are rejected.
- 7) ☒ Claim(s) 29 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 18.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 25-28, 30-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mlcak et al. (US 5,338,416; hereinafter "Mlcak").

In a method of photo-electrochemical process, Mlcak teaches either or both n and p type silicon can be selectively etched using photo-electrochemical process (col. 1, lines 13-15, 40-41; col. 2, Lines 42-55). Mlcak teaches that in forming various device structures, said selectively etching (so-called removing in the instant claims) may be

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used for other semiconductor materials such as CdTe using suitable electrolytes, see col. 7, lines 42-45. Hence, it would have been obvious to one with ordinary skill in the art to forming an N-type contact on an alloy semiconductor material comprising a compound (such as CdTe) having at least a first component the method comprising photo-electrochemical removal of the first component to form the N-type contact because Mlcak also teaches that said selectively etching (so-called removing in the instant claims) may be used for other semiconductor materials such as CdTe. Mlcak teaches that the method may be used to etch either n or p type material. Fig. 1 shows an example of depositing material and connecting the deposited material to a terminal of a power supply, connecting an electrode disposed in an electrolyte solution to a terminal of the power supply and exposing the electrolyte solution to a light source. Hence, it would have been obvious to one with ordinary skill in the art to modify Fig. 1 for the proper connection in order to use said photo-electrochemical process to accommodate specific N-type or P-type material application.

As to dependent claims 30 and 31, Mlcak teaches that various wavelengths may be used and etching may occur with wavelengths corresponding to sub-bandgap illumination (col. 3, lines 10-20). Mlcak also teaches that various electrolytes may be used for the application (col. 2, lines 50-52). Wavelength of light and pH of the electrolyte solution are commonly determined by routine experiment in the art of etching, in the absence of showing criticality or unexpected results, which is different in kind and not merely in degree from the results of the prior art, it would have been

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obvious to one of ordinary skilled in the art to determine suitable ranges through routine experimentation in order to produce an expected result.

The above-cited claims differ from prior art by various features well known to the art of semiconductor device fabrication (metal deposition in claim 33; vacuum deposition or electrodeless chemical exchange in claim 35). It is the examiner's position that a person having ordinary skill in the art at the time of the instantly claimed invention would have found it obvious to modify Mlcak by adding any of same well-known features to same because these features would have been anticipated to provide their art recognized advantages and thus produce an expected result. See admitted prior art (page 2) as evidences of vacuum deposition being a notoriously well-known method for depositing P-type metal.

4. Claims 37-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mlcak et al. (US 5,338,416; hereinafter "Mlcak") as applied to claims 25-28, 30-36 above, and further in view of Kohl et al. (US 4,369,099; hereinafter "Kohl").

The discussion of modified Mlcak from above is repeated here.

Unlike the claimed invention, Mlcak does not teach using chemical etching for the P-type component. In a method for etching P-type semiconductor, Kohl teaches using chemical etching the P-type component. The etching may comprise exposing the semiconductor to an oxidizing agent comprising nitric acid and phosphoric acid. Hence, it would have been obvious to one with ordinary skill in the art to modify Mlcak by using chemical etching process as taught by Kohn in order to complete the desired compound

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semiconductor. The limitations of claims 37, 39, and 42-44 have been addressed above and rejected for the same reason, *supra*.

As to dependent claim 38, because the same materials are used with the same process steps, it appears that the method of combined prior art would inherently contain the same properties and functions as claimed.

The instant claims 40 and 41 differ from prior art by specifying the volume ratio of nitric acid, phosphoric acid, and water. However, the composition / concentration is commonly determined by routine experiment in the art of etching, in the absence of showing criticality it would have been obvious to one of ordinary skilled in the art to determine the suitable volume ratio through routine experimentation in the combined prior art in order to produce an expected result.

Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical ( i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). *In re Woodruff*, 16USPQ2d 1934,1936 (Fed. Cir.1990); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

## CRITICALITY OF PROCESSING PARAMETERS

"Where the principal difference between the claimed process and that taught by the reference is a temperature difference, it is incumbent upon applicant to establish criticality of that difference" *Ex parte Khusid*, 174 USPQ 59. This decision is clearly analogous to pressure differences and other process parameters. If applicant can

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establish a showing of criticality in the claimed process parameter, the rejection will be withdrawn.

### ***Response to Arguments***

5. Applicant has argued that Mlcak does not teach using photo-electrochemical removal of a component of an alloy semiconductor but rather etching silicon material. As has been stated in the office action, Mlcak teaches that, in forming various device structures, photo-electrochemical selectively etching (so-called removing in the instant claims) may be used for other semiconductor materials such as CdTe using suitable electrolytes, see col. 7, lines 42-45. Hence, it would have been obvious to one with ordinary skill in the art to forming an N-type contact on an alloy semiconductor material.

Applicant has argued the routine experimentation of process parameters of claims 30, 31, 40, and 41. As has been stated in the office action, changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical (i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). If applicant can establish a showing of criticality in the claimed process parameter, the rejection will be withdrawn.

Applicant has argued that vacuum deposition being a notoriously well-known method for depositing P-type metal in claims 33 and 35. As has been stated in the office action, See admitted prior art (page 2) as evidences.

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Applicant has argued that claim 42 does not recite chemical etching to remove p-type material. In response, applicant recites removing the second component, which does not exclude the p-type material, and the combined prior art teaches chemical etching p-type material to form a semiconductor device, therefore, it includes forming various p-type contacts.

### ***Allowable Subject Matter***

6. Claims 1-6 are allowed.

Claim 29 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Meyers et al. (US 4,710,589) show using alloy semiconductor comprising a combination of Group II and VI element for PIN related products. See abstract; col. 2, lines 58-65; col. 4, lines 14-25.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

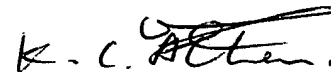


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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (703) 305-0222. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-2934.



Kin-Chan Chen  
Primary Examiner  
Art Unit 1765

June 10, 2003